

atoms ( $Y_1$ )<sub>m</sub> can be heteroatom(s) such as sulfur atom(s), nitrogen atom(s) and/or oxygen atom(s) and the rest atoms can be carbon atoms (in this case, the ring is a heterocycle). The ring can be saturated or unsaturated, and the ring preferably has unsaturated bond(s). "n" is preferably 1 to 5, more preferably 1 to 3, the most preferably 2 or 3.  $X_3$  is a substituent of the ring and is halogen, hydroxyl or lower alkyl. The  $X_3$  number "l" is preferably 0 to 6, more preferably 0 to 4, the most preferably 0 to 2.

In the organic groups  $R_3$  and  $R_4$ , the radical polymerizable group can be a functional group such as vinyl, (meth)acryloyl or (meth)acryloyloxy. The organic groups  $R_3$  and  $R_4$  having no radical polymerizable group can be lower alkyl having one to five carbon atoms. The heteroatom(s) can be nitrogen atom(s), oxygen atom(s) and/or sulfur atom(s).

In  $-(OR)_{n2}$  of  $M_3$  and  $M_4$ , a carbon number of the lower alkylene R is preferably one to five, more preferably one to three. Examples of OR are oxymethylene, oxyethylene, oxypropylene, oxybutylene and the like. Examples of  $(OR)_{n2}$  ( $n2$  is an integer of 2 to 5) are dioxymethylene, dioxyethylene, dioxypropylene, dioxybutylene, trioxymethylene, trioxyethylene, trioxypropylene, trioxybutylene, tetraoxymethylene, tetraoxyethylene, tetraoxypropylene, tetraoxybutylene and the like. When the lower alkylene R has hydroxyl, the hydroxyl can exist at any positions of the alkylene, and an example of the alkylene having hydroxyl is (2-hydroxy)propylene.

The sulfide-based cyclic compound [II] is exemplified hereinafter.

Symmetric compounds having functional groups (acryl, methacryl, vinyl) at the 2nd-, 3rd-, 4th-position of the phenyl ring:

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bis(2-(meth)acryloylthiophenyl)sulfide, bis(2-vinylthiophenyl)sulfide,  
bis(3-(meth)acryloylthiophenyl)sulfide, bis(3-vinylthiophenyl)sulfide,  
bis(4-(meth)acryloylthiophenyl)sulfide and bis(4-vinylthiophenyl)sulfide,  
Asymmetric compounds having functional groups (acryl, methacryl, vinyl) at  
the 2nd-, 3rd-, 4th-position of the phenyl ring:

2-(meth)acryloylthiophenyl-3'-(meth)acryloylthiophenylsulfide,  
2-(meth)acryloylthiophenyl-4'-(meth)acryloylthiophenylsulfide,  
3-(meth)acryloylthiophenyl-4'-(meth)acryloylthiophenylsulfide,  
2-vinylthiophenyl-3'-vinylthiophenylsulfide,  
2-vinylthiophenyl-4'-vinylthiophenylsulfide,  
3-vinylthiophenyl-4'-vinylthiophenylsulfide,  
2-(meth)acryloylthiophenyl-3'-vinylthiophenylsulfide,  
2-(meth)acryloylthiophenyl-4'-vinylthiophenylsulfide and  
3-(meth)acryloylthiophenyl-4'-vinylthiophenylsulfide.

Compounds having functional groups (acryl, methacryl, vinyl) and  
substituents (halogen, lower alkyl, hydroxyl) at the 2nd-, 3rd-, 4th-position  
of the phenyl ring: bis(3-bromo-2-(meth)acryloylthiophenyl)sulfide,  
bis(4-chloro-2-(meth)acryloylthiophenyl)sulfide,  
bis(3-hydroxy-2-vinylthiophenyl)sulfide,  
bis(2-methyl-3-(meth)acryloylthiophenyl)sulfide,  
bis(4-propyl-3-(meth)acryloylthiophenyl)sulfide,  
bis(2-ethyl-3-vinylthiophenyl)sulfide,  
bis(2-butyl-4-(meth)acryloylthiophenyl)sulfide,  
bis(3-pentyl-4-(meth)acryloylthiophenyl)sulfide,  
bis(2-hydroxy-4-vinylthiophenyl)sulfide,

3-bromo-2-(meth)acryloylthiophenyl-3'-(meth)acryloylthiophenylsulfide,  
 3-ethyl-2-(meth)acryloylthiophenyl-4'-(meth)acryloylthiophenylsulfide,  
 2-hydroxy-3-(meth)acryloylthiophenyl-4'-(meth)acryloylthiophenylsulfide,  
 3-bromo-2-(meth)acryloylthiophenyl-2'-butyl-3'-(meth)acryloylthiophenyl-  
 sulfide, 3-ethyl-2-(meth)acryloylthiophenyl-3'-hydroxy-4'-(meth)acryloyl-  
 thiophenylsulfide, 2-hydroxy-3-(meth)acryloylthiophenyl-2'-chloro-4'-  
 (meth)acryloylthiophenylsulfide, 3-bromo-2-vinylthiophenyl-2'-butyl-3'-  
 vinylthiophenylsulfide, 3-ethyl-2-vinylthiophenyl-3'-hydroxy-4'-  
 vinylthiophenylsulfide, 2-hydroxy-3-vinylthiophenyl-2'-chloro-4'-  
 vinylthiophenylsulfide, 3-bromo-2-(meth)acryloylthiophenyl-2'-butyl-3'-  
 (meth)acryloylthiophenylsulfide, 3-ethyl-2-(meth)acryloylthiophenyl-3'-  
 hydroxy-4'-(meth)acryloylthiophenylsulfide, 2-hydroxy-3-(meth)acryloyl-  
 thiophenyl-2'-chloro-4'-(meth)acryloylthiophenylsulfide,  
 3-bromo-2-(meth)acryloylthiophenyl-2'-butyl-3'-vinylthiophenylsulfide,  
 3-ethyl-2-(meth)acryloylthiophenyl-3'-hydroxy-4'-vinylthiophenylsulfide and  
 2-hydroxy-3-(meth)acryloylthiophenyl-2'-chloro-4'-vinylthiophenylsulfide.

Compounds having functional groups (acryl, methacryl, vinyl),  
 substituents (halogen, lower alkyl, hydroxyl) and the organic groups M<sub>3</sub>, M<sub>4</sub>  
 at the 2nd-, 3rd-, 4th-position of the phenyl ring: 3-bromo-2-  
 (meth)acryloyloxymethoxythiophenyl-2'-butyl-3'-vinylthiophenylsulfide,  
 2-hydroxy-2-(meth)acryloyloxyethoxythiophenyl-3'-hydroxy-4'-  
 vinylthiophenylsulfide, 3-ethyl-3-(meth)acryloyloxypropoxythiophenyl-2'-  
 chloro-4'-vinylthiophenylsulfide, 3-bromo-2-(meth)acryloyloxydimethoxy-  
 thiophenyl-2'-butyl-3'-(meth)acryloyloxydiethoxythiophenylsulfide,  
 3-ethyl-2-(meth)acryloyloxydiethoxythiophenyl-3'-hydroxy-4'-